vanities on the assumption that the present world is all?" (429).

Despite my radical dissent from Dr. Ward's pluralism, with its concessions to what I am bound to call irrationalism, his book has made a profound impression upon me. It is a work which any man may well peruse as a discipline in self-education, and this without reference to the field of his specialty. Assuredly, we have to thank Dr. Ward for a human, and therefore significant—often a wise—pronouncement. A main portion of the charm of the work is traceable to the skill shown by the author in conferring distinction upon the commonest things.

R. M. WENLEY

ANN ARBOR

BOTANICAL NOTES

THE PASSING OF THE SLIME MOULDS

DE BARY, whose keen botanical perception has perhaps never been equalled, long ago discarded the name Myxomycetes for the slime moulds, significantly applying to them the name Mycetozoa, and then placed them outside the limits of the vegetable kingdom, greatly to the consternation and indignation of many fungologists of the old school. The latter, relying upon external characters, associated them for a long time with the puffballs among the higher fungi, implying a relationship whose impossibility is now manifest to the merest tyro in botany. Latterly they have been pushed down into the neighborhood of the schizophytes (blue-green algæ, and the bacteria), as is done by Engler in his "Syllabus," but he takes particular pains to disclaim any relationship with the true fungi (*Eumycetes*), or higher plants.

More than thirty years ago the writer of this note said of them "they have no structural affinities with plants higher than they are, nor with any lower; they stand alone, and appear to belong to a different genetic line" ("Botany," p. 207), although in deference to the views as to their nature then prevalent they were still included among plants. By speaking of them as "a group of remarkable organisms which differ in many respects from all other vegetable structures," and by comparing them to certain Protozoa the attempt was made to educate the reader to regard them as aliens instead of true plants. In later publications they have been omitted as no longer necessary to be spoken of in a systematic arrangement of plants.

The final disappearance of these animals from the domain of botany seems now imminent, for in the new (eleventh) edition of the Encyclopaedia Britannica they are treated under De Bary's name of Mycetozoa, with the introductory defining phrase "in zoology, a group of organisms reproducing themselves by spores." The whole treatment, which is by J. J. Lister, is zoological, and no doubt is expressed as to their animal nature. We may now look for an approaching general revision of our botanical text-books so as to omit the Mycetozoa, greatly to the relief of the scientific botanists who have long been sorely puzzled to find a proper niche in which to fit them in the vegetable kingdom.

It will now be necessary for the zoologists to prepare to take charge of the considerable number of Mycetozoa to which they fall heir. It behooves the botanists to generously remove the specimens of these organisms from the pigeon-holes of their herbaria, and turn them over to the zoologists to be placed by them on the museum shelves devoted to the Sarcodinia among the Protozoa. And further it will become necessary for the librarians to revise their system of classifying botanical and zoological books so as to make the proper transfers upon their shelves and in their card catalogues. When all this is done the botanists may feel that they are well rid of these animals that have too long roamed quite too freely in the botanical garden. The "slime moulds" will have passed from the domain of botany, and there will remain in their stead only the "fungus animals."

THE SECRET OF THE BLUEBERRIES

IF to make "two blades of grass grow where but one grew before" has been regarded as a laudable undertaking, what shall we say of the successful effort to make blueberries grow

where they would not grow at all, and yet this is what F. V. Coville, the government botanist, seems to have done. In an interesting bulletin (193) of the Bureau of Plant Industry of the U. S. Department of Agriculture which appeared a little more than a year ago, Mr. Coville shows that blueberries (mainly of the species *Vaccinium corymbosum,* known as the swamp blueberry) differ from many ordinary plants in their soil requirements, and with the knowledge thus attained he has worked out a system of culture that promises to result in their successful culture. In the course of his paper it is shown that the swamp blueberry "does not thrive in a rich garden soil," nor on "heavily manured soil," and so for soil treated by lime, heavy clay soil, ordinary leaf mold soil, or any soil with a neutral or alkaline reaction. On the contrary, it is shown that it requires an acid soil, such as afforded by peat.

Applying these facts, Mr. Coville has successfully grown many plants of the swamp blueberry in pots, and their robust growth affords good promise of success in the field. The investigation with pot cultures is to be followed with those in the field and in this considerable progress has been made. "There is good prospect that the application of the knowledge thus gained [from the pot cultures] will establish the blueberry in field culture, and that ultimately improved varieties of these plants will be grown successfully on a commercial scale."

THE GRAMA GRASSES

David Griffiths has rendered a good service to students of the grasses by the publication of his paper on "The Grama Grasses" (Contrib. U. S. Nat'l Herbarium, Vol. 14, pt. 3, 1912), in which he describes the species (46) included in the genus *Bouteloua* (36), *Cathestecum* (4), *Pentarrhaphis* (2), and *Triaena* (1). By means of good figures the details of the spikelets are made plain, and these are supplemented by full descriptions, and a citation of specimens in the National Herbarium. The synonymy of these species is given very fully with critical notes. From this portion of the paper we learn why the more common species now bear the names *Bouteloua hirsuta, B. gracilis* (instead of *B. oligostachya*), and *B. curtipendula* (instead of *Atheropogon curtipendula*). One new species of *Cathestecum* and two of *Bouteloua* are described.

In speaking of their economic importance the author says: "It is doubtful whether there is another group of native pasture grasses which is of as much economic importance as this when both quality and quantity are considered." "The most promising of all the species for field cultivation is *B. curtipendula,* not that it grows any more readily than the others, but on account of its size and habit." "*Bouteloua gracilis* makes a splendid turf when sown thickly and well cared for." However, on account of the difficulty in collecting seed he has to say at last that "in short, it is more than probable that because of the lack of good seed habits in this genus, even the most valuable species can not become of importance in cultivation."

BOTANICAL NOTES

A number of papers on the fungi should be noted here—the first, by W. C. Coker and Louise Wilson (in *Mycologia,* November, 1911), on a curious "conjugating yeast" (*Schizosaccharomyces octosporus*) in fermenting grapes, in which the plants multiply vegetatively not by budding, as in other yeasts, but by fission. The "conjugating" cells constitute "a double sac that resembles a pair of saddle-bags" and in this structure eight spores are produced.

The "Experiments on Spore Germination and Infection in Certain Species of Oomycetes" (Research Bull. 15, Wisconsin Experiment Station) by I. E. Melhus, are concerned with the White Rust of Crucifers (*Cystopus (Albugo) candidus*). It was found that the spores germinate best in water and rather low temperatures, and that plants are more easily infected at low temperatures, also, probably "due to the increased percentage of spore germination."

DR. RICHARD DE ZEEUW publishes a helpful paper in the *Centralblatt für Bacteriologie, Parasitenkunde und Infektionskrankheiten*, 1911, on the "Comparative Viability of Seeds, Fungi and Bacteria when Subjected to Various Chemical Agents," in which he shows that the disinfection of seeds, etc., is by no means as easily accomplished as has been supposed, and that the results of many experiments requiring disinfection are open to criticism.

WE can not pass by without at least brief mention the *Journal of the College of Agriculture of the Imperial University of Tokyo* (Japan), in the December number of which are two articles by Professor Dr. S. Kusano, the first, on "*Gastrodia elata* and its Symbiotic Association with *Armillaria mellea*," showing that this chlorophyll-less orchid lives in a beneficially symbiotic relation with the mycelium of the fungus. The second paper, "On the Root-Cotton, a Fibrous Cork Tissue of a Tropical Plant" (*Fagara integrifolia*), shows that "the root-cotton is a kind of cork tissue derived from the cork cambium, which arises primarily from the pericycle or secondarily from the bast of the root." The author concludes that it is of economic value, "chiefly in its unwettable and less hygroscopic quality." The papers are illustrated by seven very fine plates.

CHARLES E. BESSEY
THE UNIVERSITY OF NEBRASKA

THE RELATION OF PIGMENTATION TO TEMPERATURE IN DEEP-SEA ANIMALS

PROFESSOR C. V. BURKE'S article on the relation of color of certain sea-animals to the depth at which they live[1] is of much more than ordinary importance, for it may be possible to coordinate these facts with similar ones as to tropical land animals which show that pigmentation is of great, if not vital importance in heat regulation. In nearly all the biological literature on the subject, it is assumed that the sole use of pigment is for concealment by more or less resemblance to something in the background or to the background itself. This may be true of all colors but pigment of any color, if opaque enough, may protect underlying tissues from death due to excessive light, a matter to which von Schmaedel first called attention as to man, nearly twenty years ago. This rule has now been found to be universal, for in every species there is a pigment or other protection proportionate to the intensity of the light. In the 1887 *Proceedings of the Royal Society of Edinburgh*, Dr. Robert Wallace, now professor of agriculture in the University of Edinburgh, published another epoch-making observation, which, like that of Mendel and of many others, was completely ignored for a quarter century. Wallace found that all the domestic mammals of the tropics had black skins, and though Huxley was much impressed by the universality of the phenomenon, he could suggest no reason for it because up to the time of his death very little was known as to the deadliness of the shorter ether waves to all naked living tissues, such as in the case of bacteria for instance; and though we then used sunlight to "disinfect," by killing our parasites, no one had yet perceived that it could also kill us. It is now known that the main purpose is light protection, and there is a wealth of evidence that if unpigmented stock is taken from dark climates to light ones it dies out. The agricultural experimenters have utterly failed to establish the big white swine in our west or in any light climate and at the present moment, in many parts of the world, farmers are vainly trying to breed imported stock insufficiently pigmented. The matter is of such great practical importance that it must be cleared up at once to stop the present wasteful methods.

It has also long been known that black assists heat radiation in all temperatures below body heat. These black-skinned domestic animals are then the fittest for tropical temperatures, but they can not expose themselves to the sun because of the fatal absorption of heat. They instinctively hide in the day, if the skin is not covered by a reflecting coat as in the Arab horse. In cold light countries

[1] SCIENCE, October 6, 1911.